

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPLICATION FOR U.S. LETTERS PATENT**

TITLE:

VEHICLE TRACTION MAT

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VEHICLE TRACTION MAT

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 60/413,168, filed September 25, 2002.

BACKGROUND OF THE INVENTION

Field of the Invention

[001] The present invention relates generally to a traction mat for a vehicle. More particularly, relating to a traction mat for use on low coefficient of friction surfaces, such as ice or hard packed snow.

Description of the Prior Art

[002] In the past a number of traction devices for use with vehicles have been proposed and constructed to improve the traction of the driving wheels of the vehicle. These devices include chains which are wrapped around and secured to the drive wheels for providing additional traction. Rigid frames having surface gripping elements which are placed upon the ground so that the drives wheels can be driven over the frames. Mats formed of chain mesh of varying size have been proposed and constructed for placement on the ground to provide for an anti-skid surface for the vehicle to traverse. Metal reinforced sheeting has been employed including an abrasive or grit-like coating to provide traction between the sheeting and the vehicle wheel. Segmented mats having a number of mats aligned end to end and connected by bands, links, rings or otherwise fastened together have been provided in many different configurations. The configurations range from mats that are very flexible to conform to the surface to rigid mats including wedge-shaped devices that are adapted to be driven into soft ground adjacent the underside of drive wheels for frictional contact therewith to provide a greater degree of traction.

[003] An example of a vehicle traction mat present in the art is disclosed in U.S. Patent 4,265,399 to Covington. This patent discloses an anti-skid device comprising several frames arranged end to end and connected together to form an elongated track of iron mesh for a vehicle to traverse across.

[004] Similarly, U.S. Patent 2,667,502 to Denker et al. discloses a traction device for extricating automobiles immobilized in snow banks and mud holes or on ice. The device includes a flexible open mesh mat of expanded metal which is placed against the leading edge of a drive wheel of the immobilized automobile. The edges of the mat are folded back onto itself to provide for a higher degree of grip with the surface it is placed upon.

[005] The U.S. Patent 3,786,989 to Haynes, also discloses a traction mat for placement beneath the driving wheel of an automobile disabled on an ice, snow or mud covered road. The traction mat is constructed from expanded metal and includes a plastic coating applied to the edges thereof for preventing injury to a user.

[006] Lastly, United States Patent 2,443,319 to Mack discloses a traction mat for extricating a vehicle bogged down in mud, stuck in snow or ice that has a multiple segments of light or medium gage expanded metal attached together end-to-end by rings. The segments are of relatively short length between eight to six inches and are flexible so that the device is able to conform to irregular surfaces.

[007] While the above-described devices fulfill their respective, particular objectives and requirements, the aforementioned patents have reduced usability on slippery surfaces, such as ice. The traction mats of the prior art are directed towards providing a single traction mat for use in extricating vehicles that have become immobilized in mud, stuck in snow or on ice. While this may add to a user's convenience by providing a single traction mat that can be used in all of the above conditions, efficiency of the mat in a one particular condition is

sacrificed to provide a mat that is useable in all conditions. As such, the prior art devices have not been designed for use only on slippery surfaces such as ice and therefor do not provide a high degree of traction that is other wise attainable.

[008] While ice is relatively hard with respect to snow or mud surfaces the actual hardness of ice varies substantially with temperature and as such the hardness of ice is determined by how easily an object can penetrate it. The hardness of ice can vary from a value of 1.5 at 0°C to 7 at -40°C on the Mohs Scale of hardness. Although it is very unlikely that ice having a hardness value of 7 will ever be encountered by a motorist it is very likely for a motorist to encounter ice having a hardness from 1.5 in temperate winter climates to 3.0 or higher in more extreme winter climates.

[009] Therefore, a need exists for a new and improved vehicle traction mat that can be used for extricating a vehicle immobilized on an iced or hard packed snow surface. In this regard, the present invention substantially fulfills this need.

SUMMARY OF THE INVENTION

[010] In accordance with the present invention, a vehicle traction mat for aiding in traction of a vehicle drive tire on ice is provided. The traction mat comprises a sheet of expanded metal of generally rectangular shape and having a plurality of openings formed therethrough. The sheet is adapted to be wedged between an iced or hard packed snow surface and the drive tire along the leading edge of the drive tire. The sheet includes anti-skid projections on opposing faces for engagement with the surface and the vehicle tire. The projections on one face of the sheet are for penetrating the ice to retain the sheet in a non-sliding relationship with the ice and the projections on the opposite face are for engagement with the tire providing traction thereto. The vehicle traction mat is most efficiently used with iced surfaces wherein the ice has a Mohs hardness from about 1.5 to about 3.0.

[011] Hardness is measured in a number of ways, all of them empirical methods. The first, and oldest, method is that of scratch testing where if material *A* can scratch material *B*, then material *A* is harder than *B*. The Mohs Hardness Scale is a system of reference materials against whose hardnesses a sample is compared.

[012] In accordance with an additional aspect of the present invention, a vehicle traction mat kit for aiding in traction of a vehicle drive tire on ice is provided. The kit is intended to be used in emergency situations and includes at least two traction mats comprised of expanded metal of generally rectangular shape and have a plurality of openings formed therethrough. The sheets are adapted to be wedged between an iced surface and the drive tire along the leading edge of the drive tire and the sheets include anti-skid projections on opposing surfaces thereof to engage the iced surface and the tire. The kit is provided having at least two sheets of expanded metal with different mesh sizes, thereby affording different degrees of traction to provide a user with a choice of sheets for use on various surface conditions. The mesh size is expressed in open area percentage.

[013] There has thus been outlined, rather broadly, the more important features of the invention in order that the detailed description thereof that follows may be better understood and in order that the present contribution to the art may be better appreciated.

[014] Numerous objects, features and advantages of the present invention will be readily apparent to those of ordinary skill in the art upon a reading of the following detailed description of presently preferred, but nonetheless illustrative, embodiments of the present invention when taken in conjunction with the accompanying drawings. In this respect, before explaining the current embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various

ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of descriptions and should not be regarded as limiting.

[015] As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

[016] The principal object of the present invention is to provide a vehicle traction mat for aiding in traction to a vehicle drive tire on ice.

[017] Another object of the present invention is to provide a vehicle traction mat which has superior degree of traction on iced surfaces.

[018] Still a further object of the present invention is to provide a vehicle traction mat kit which provides a user with traction mats from which to chose a mat for use in a particular condition.

[019] Yet an additional object of the present invention is to provide a vehicle traction mat which is portable in size and is easily handled.

[020] Lastly, it is an object of the present invention to provide a vehicle traction mat and method of operating the same that has a low cost of manufacture with regard to both materials and labor, and which accordingly is then susceptible of low prices of sale to the consuming public, thereby making such traction mat economically available to the buying public.

[021] These together with other objects of the invention, along with the various features of novelty that characterize the invention, are pointed out with particularity in the claims

annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[022] The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

[023] Figure 1 is a perspective view of the preferred embodiment of the vehicle traction mat constructed in accordance with the principles of the present invention.

[024] Figure 2 is a top plan view of the vehicle traction mat of the present invention.

[025] Figure 3 is an enlarged side view of a section of the vehicle traction mat of the present invention.

[026] The same reference numerals refer to the same parts throughout the various figures.

DETAILED DESCRIPTION OF THE INVENTION

[027] The present invention teaches away from the prior art by providing for a traction mat that is designed for use only with a particular surface condition opposed to providing a single traction mat that is usable with a wide range of surface conditions. The problem inherent with prior art traction mats is found in providing a single traction mat that is designed to afford some degree of traction to a vehicle tire on a wide range of surface conditions, such as mud, sand, snow and ice by sacrificing attainable traction in one condition over another.

While these prior art devices do afford some user convince in providing a single traction mat that is usable on all of the above mentioned surface conditions a void is created in the art by over looking a user that encounters a surface condition more frequently over another, and requires the highest possible degree of traction attainable with the frequently encountered condition. The present invention substantially fills the void created by the prior art by providing a traction mat that is design for use only with a particular surface condition, such as ice and hard packed snow.

[028] Now referring to the drawings, and particularly to FIGS. 1-3, a preferred embodiment of the vehicle traction mat of the present invention is shown and generally designated by the reference numeral 10.

[029] In Figures 1, 2 and 3 a new and improved vehicle traction mat 10 of the present invention for extricating a vehicle immobilized on ice or hard packed snow that has endured a hard freeze is illustrated and will be described. More particularly, the vehicle traction mat 10 comprises a sheet 12 of raised expanded metal which is generally rectangular in shape. The sheet 12 includes closely spaced openings 14 which are defined by strands 16 which are connected together by bonds 18. The strands 16 form the sides of the openings 14 and the bonds 18 are where the stands intersect. In other words, the bond 18 is where each opening 14 is connected with the next opening. The openings 14 are generally diamond shaped and can be described by four measurements taken across the dimensional diamond shaped opening.

[030] The first dimensional measurement is the Short Way of the Diamond (SWD), which is the distance from the middle of the bond on one side to the middle of the bond on the opposite side. The second dimensional measurement is the Long Way of the Diamond (LWD), which is the distance across the largest dimension of the diamond measured halfway between the diamonds. The third dimensional measurement is the Short Way of the Opening (SWO), which is the width of the opening of the shortest side of the diamond. The SWO

does not include the strand width, where the SWD does. The fourth dimensional measurement is the Long Way of the Opening (LWO), which is the length of the opening of the longest side of the diamond. LWO does not include the strand width, where the LWD does.

[031] The number of openings 14 per unit area is defined as the Open Area (OA). The OA is the total area of the openings divided by the total area of the sheet and expressed in as a percent. In other words, OA describes how much of the expanded metal sheet is open space. For example, if the expanded metal sheet has a 35 percent OA, then 60 percent of the expanded metal is open space and 65 percent is material.

[032] Gauge or thickness of the expanded metal sheet is the measurement from the top surface to the bottom surface of the sheet before expansion. Gauge is the most common measurement, but thickness can also be measured in fractional inches and converted into gauge. All references made to gauge herein is made towards the American Wire Gauge (AWG) standard.

[033] The strands 16 and the bonds 18 form ideal anti-skid projections on opposing surfaces of the sheet 12, such that when the traction mat 10 is laid upon an iced or hard compacted snow surface the projections on one face of the sheet dig into the surface and the projections on the other surface provide traction to the vehicle tire. The sheet 12 is flexible to conform to surface irregularities. While the sheet has some rigidity is not rigid enough to provide for bridging support to a vehicle tire and is intended to be used for providing a higher degree of traction to a vehicle tire which is slipping on a hard surface, such as ice or hard packed snow. The present invention will not afford a high degree of traction to a vehicle tire immobilized in deep mud or the like.

[034] Through experimentation by varying the aforementioned dimensions of the openings 14 of the sheet 12, it was discovered that an opening having a SWD dimension that is from about 37% to about 50% of the LWD dimension of the opening provides the highest degree

of traction attainable on ice having a Mohs hardness from about 1.5 to about 3.0 and on hard packed snow. It is critical to the discovered improved degree of traction of the traction mat for the SWD dimension not to exceed about 0.75 inches and not to be less than about .1875 inches and the LWD dimension not to exceed about 2.00 inches and not to be less than about 0.75 inches. Furthermore, it is critical for the open area percentage of the sheet to be between 40 to 60 percent.

[035] The rectangular sheet 12 is rectangular shape with the longest side of the sheet being parallel to the SWD dimensional direction of the openings 14. Preferably, the sheet 12 has a width that is from about 16% to about 27% of the length of the sheet. Ideally for ease in handling and storing the sheets, the length of the sheet should not exceed 60 inches and should not be less than 24 inches and the width should not exceed 16 inches and should not be less than 4 inches. In the preferred embodiment, the sheet 12 has a width that is from about 16% to about 27% of the length of the sheet and the sheet has an open area percentage from about 40% to about 60%. Furthermore, the sheet 12 is manufactured from a material having a Mohs scale number greater than 3, preferably from low carbon steel or stainless steel so that the sheet will effectively penetrate the iced or hard packed snow surface.

[036] The sheet 12 is cut from a larger sheet of expanded metal to the desired size. Preferably, the sheet 12 is cut from a larger sheet of expanded metal by bond shearing. Bond shearing is where the material is cut on or near the center of the bond to eliminate prongs or jagged edges, thereby reducing the chance of injury to a user or damage of property by the jagged edges. Referring to Figure 1, the sheet 12 must be cut so that the length or the longest side of the sheet is parallel to the SWD dimensional direction and so that the width of the sheet is parallel to the LWD dimensional direction. The sheets 12 can be cut from larger sheets of expanded metal that are 14 AWG to 22 AWG.

[037] In a further embodiment of the present invention, an emergency kit is provided that includes a plurality of sheets 12 that are each designed for use with different surface

conditions so that a user can select a mat that will provide the highest degree of traction available for a particular surface condition. In one example, a kit can be provided including at least 2 sheets 12 each having a different open area percentage. The kit can be provided to include at least 2 sheets 12 where the sheets including openings 14 having a SWD dimensional length that is from about 37% to about 50% of the LWD dimensional length of the openings. The kit can be provided to include at least 2 sheets each having a different open area percentage and each sheet having a width that is from about 16% to about 27% of the length of the sheet. Preferably, at least 2 sheets 12 are provided each having a different open area percentage from about 40 to about 60 percent. The sheets 12 are flexible to conform to surface irregularities. In additional example, a kit is provided having at least two pairs of sheets 12 where each sheet in a single pair have the same open area percentage and each pair of sheets have an open area percentage which is different than the open area percentage of any other pair of sheets provided.

[038] In use, it can now be understood that a vehicle traction mat 10 is selected having a suitable mesh size defined by the SWD and LWD dimensions or the open area percentage for use with the current surface condition. The traction mat 10 is positioned and is adapted to be wedged between the leading edge of a slipping drive tire of a vehicle and the road surface along the axis of the SWD direction with the shortest length of the sheet juxtaposed to the tire. Upon applying power to the slipping drive tire, the mat is slightly pulled between the tire and the surface whereby the projections on the lower surface of the mat dig into and grip the surface while the projections on the upper surface provide traction to the drive tire. The projections that are engaged with the surface become slightly compressed as the traction mat 10 becomes loaded with the weight of the vehicle, thereby causing the projections to expand within the surface providing for a higher degree of grip between the traction mat and the road surface, thereby preventing the drive tire from throwing the traction mat. Additional mats 10 may be placed end-to-end, without being joined together by a ring or any other means, to provide for a temporary roadway to get the vehicle back upon a drivable

surface. If more than one drive tire is slipping a traction mat 10 may be positioned to provide traction for each slipping tire.

[039] It is important to note that the traction mats 10 of the present invention are not intended to be used in extricating a vehicle that has become bogged down in deep mud or snow or the like and that the usability of the mats is in providing traction to vehicle tires slipping on surfaces having a low coefficient of friction, such as ice or hard packed snow.

[040] While a specific form of the invention has been described and illustrated herein, it is to be understood that the same may be varied within the scope of the appended claims, without departing from the spirit of the invention.